

## Introduction

Holderness lies in a diverse area of the Lakes Region with many important natural resources available to the town and its residents. Surface and groundwater resources abound in Holderness, and numerous wetlands protect drinking water supplies, prevent flood damage, and provide exceptional wildlife habitat. Productive soils grow extensive forests and maintain the scattered agricultural lands in town. Clean air, water, and land continue to attract visitors and year-round residents alike.

The following issues identified by the Planning Board and the Conservation Commission address the conservation, preservation and natural resource concerns of Holderness:

- Protect wetland habitat.
- Prevent the fragmentation of the landscape in order to preserve wildlife habitat.
- Protect the upper elevations of the town's watersheds, including its working forests.
- Protect the shores of Squam Lake, Little Squam Lake, the many ponds located in Holderness, the Pemigewasset River and feeder streams.
- Offer protection for its stratified drift aquifers.
- Ensure that development is not in conflict with natural resources protection.

Keeping these issues in mind, this chapter will address the current status of natural resources within Holderness and serve as a guide for their conservation and protection.

### 1. Physical Landscape

Holderness lies in the heart of the Lakes Region of New Hampshire. This region is known for an abundance of lakes and ponds amidst sandy glacial outwash and till. It is largely forested, with hemlock-hardwood- pine and northern hardwood-conifer forests predominant in the uplands. The region is also transitional from the more rugged, higher elevation White Mountains to the north and low-lying plains to the southeast. As a result, some of the isolated peaks and mountain ranges contain boreal elements, such as can be found in the Squam Range and Mt. Prospect.

The town of Holderness contains 30.5 square miles of land area (85% of town) and 5.4 square miles of inland water area (15% of town). The Pemigewasset River forms the northwestern border between Plymouth and Holderness and provides a small amount of flood-basin. Holderness is dominated by mountains and hills with Mt. Prospect and The Button rising in the northern part of town and the Rattlesnake Mountains, Mt. Webster, Mt. Livermore, and Cotton Mountain in the Squam Range cutting across town from northeast to southwest. The Squam Range hugs the shoreline of Squam Lake with Carr Brook and Owl Brook flowing from the northern side of the range into Ashland, and eventually into the Squam River. On the southern shore of Squam Lake sits Shepard Hill, with Little Squam Lake to the west and White Oak Pond with several large wetland areas to the south and east. Several islands, such as Groton, Sheep, Merrill Island, Moon and Bowman Islands and part of Great Island, are all within Holderness. The islands are generally minimally developed, providing secluded habitat for plant and animal species. An average of four inches of precipitation falls each month and supplies both surface water bodies and sub-surface aquifers with needed water.

The land available for development within Holderness is limited due to the steep topography. The valley between Mt. Prospect and the Pemigewasset River, the valley between Mt. Prospect and the Squam Range, along the shoreline of Squam Lake, and the area surrounding White Oak Pond are the most level areas of town. The southern slopes of the Squam Range and Mt. Prospect have several steep areas which are significant habitat for local wildlife. South-facing steep slopes provide rocky habitat for species that depend on receiving full sunlight during the day and are important to maintain species diversity. These areas are not readily developable and therefore are somewhat protected from disturbance, but without permanent protection the habitats are vulnerable to development.

For planning purposes, slope percentages are often used to determine where development should not occur due to the steepness of the building site. The slope of an area is measured by dividing the vertical height by the horizontal length or the rise over the run. Slopes are usually considered steep, and not developable, once they reach 25% or higher gradient, which is 6% of the land in Holderness. Moderately steep slopes, 15% to 25%, comprising 18% of the land, also pose development challenges and erosion risks. The majority of the land in Holderness (76%) lies below 15% slope, with 57% below 10% slope. The degree of slope can sometimes be used to identify areas of significant wildlife habitat, for example, steep south-facing slopes provide important habitat for many plant and animal species such as bobcats. Steep slopes are addressed in the Town's Zoning Ordinance (Section 500)

### *Geology*

The bedrock and surficial geology of Holderness plays an important role in determining the town's physical environment. It directly is visible in topography, can determine drainage patterns and how soil is created and transported in addition to other processes. For planning purposes, the underlying bedrock geologic features can affect land use and development capabilities. Surficial geology directly impacts soil and groundwater.

### *Bedrock Geology*

The bedrock foundation of Holderness is comprised of Late Devonian magma domes associated with the Acadian Period of mountain-building. Upwelling crustal material formed large crystalline granites of the Littleton, Kinsman and Winnepesaukee formations during active periods of continental crust collision. The Kinsman Formation material can be identified by its large (i.e. 2-3 inch) crystals of potassium feldspar that are embedded in a fine granite or granodiorite matrix. The slightly older Winnepesaukee Formation is comprised of even, medium-sized crystals of mica, quartz, and feldspar and has a more "classic granite" look to it. It is found throughout the remainder of Holderness, including the Squam Lake trough.

### *Surficial Geology*

The majority of Holderness is covered with glacial till, a loose assortment of boulders, stones, cobbles, sand, silt and clay that was laid down by the Wisconsin ice sheet over 13,000 years ago. Most of this till comes with greater than 15% stones or boulders in the mix, and at least half of the till comes with a hardpan layer at less than three feet from the surface. The erosional byproducts of granite tend to be coarse, and so

many of the areas where glacial debris was deposited by water contain evenly sorted beds of sand particles between .05 and 2.0 mm in diameter. These “stratified drift” materials provide a good source of sand and gravel and in some cases, excellent recharge areas for groundwater. (Referenced maps will be available at the Town Hall and on the town’s website)

### *Soils*

Soil types influence land use and wildlife and can help communities determine where to focus conservation efforts and locate wildlife habitat. For example, when poorly drained soils are mapped, potential wetland areas are usually identified. When well-drained soils are found, they are favorable for development as well as suitable for agriculture preservation, which puts the two uses in conflict. Rockier soils are generally found on steeper slopes, which are prevalent in New Hampshire due to their glacial or glaciofluvial origins.

Soils are also classified relative to their use as farmland in an effort to help preserve rich soils from development. Holderness has 3,908 acres (20.1% of the 19,456 acres of land in the town) of locally important farmland soils, which does not necessarily mean that the land has been or is currently being farmed. Holderness does not have any farmland soil acreage of statewide importance.

The most dominant soil type within Holderness is Tunbridge-Lyman-Rock outcrop complex which has a 0-60% slope. The other predominant soils are rocky and often steep, such as Becket fine sandy loam (15-25% slope, very stony) and Monadnock and Hermon soils (15-25% slope). These soils are not particularly rich in organic materials and therefore not well suited for growing crops. The absence of clay in the area allows for better drainage. It is generally considered acceptable for development, though limited because zoning regulations limit development on steep slopes.

The richest soils are found on the floodplain of the Pemigewasset River in the northwestern corner of town. This is due to river flooding which deposits sediments on the river banks and the floodplain, enriching the existing soil. Other areas with sizable amounts of significant farmland soils are on the west side of Mt. Prospect, where there is also some development activity. A scattering of locally significant farmland and wetland areas surrounds White Oak Pond.

## **2. Water Resources**

Two significant water bodies help define the Holderness community, both geographically and economically. Nearly half of both Big Squam Lake, NH’s second largest lake, and Little Squam Lake are within town boundaries. To the west, the town’s boundary is the Pemigewasset River, with a significant valley and associated floodplains.

The health and well-being of the Squam Lakes and the associated waterbodies (White Oak Pond, Carr Brook, Owl Brook, Livermore Falls and West Brook) are symbiotic with the economic well-being and quality of life in town. There is a strong relationship between the town of Holderness and the Squam Lakes. Many people visit or have second homes in town due to the beauty and recreational opportunities these lakes have to offer.

*Watersheds*

A watershed is the area of land that drains into a given body of water. The concept of a watershed is important since activities on the land directly impact the health of surface water. Holderness falls within three sub watersheds all of which are contained in the larger Merrimack River Watershed. The majority of Holderness is within the Squam River Watershed, the northwest and northern parts of town are in the Middle Pemigewasset Watershed, and the southwestern tip of town is in the Winnepesaukee River Watershed.

*Surface Water*

Surface water plays a significant role in the character of Holderness, with Squam Lake dominating the southern and eastern sections of town. Half of Little Squam Lake is within the town boundaries, along with all of White Oak Pond to the south of Squam Lake. The Pemigewasset River is by far the largest river, making up the town's 3-mile westerly boundary. Holderness contains over 36 miles of streams, the longest being Owl Brook, draining the western edge of the Squam Range and the east flank of Mt. Prospect.

*Wetlands*

Wetlands provide important habitat for many species and are some of the most diverse ecosystems which exist, as well as mitigating floods during heavy rains or spring thaws.

There are 382 acres of open-water wetlands, which is 11.5% of the 3,328 acres of open-water. There are approximately 1,600 acres of wetland soils (8.2% of the land area in town), which are either poorly drained or very poorly drained. Wetland areas are near White Oak Pond, on the northern border of town south of Perch Pond, and near Carr Brook and Owl Brook towards the geographic center of town. There is also the area bordering the Pemigewasset River on the western end of town. It is south of 175A behind the gas stations and the PSU ice arena. This area is now zoned as a flood hazard district.

*Prime Wetlands*

Prime Wetlands are important wetlands designated as "Prime Wetlands" by the municipality. Their characteristics include a larger size, unspoiled character and often contain rare or threatened plant and animal species.

Holderness has designated its prime wetlands according to the requirements of RSA 482-A:15 and through the NH Department of Environmental Services (NH DES) Wetlands Bureau. Once the wetlands are evaluated and designated by the municipality, DES reviews the submission and, upon approval, will consider any future projects that are in or adjacent to its Prime Wetlands as major projects which require a field inspection and a public hearing. A map of the Prime Wetlands in Holderness is available on the Town of Holderness website. (Referenced maps will be available at the Town Hall and on the town's website)

*Vernal Pools*

There are vernal pools scattered across Holderness which provide important temporary wetland habitat to a wide range of species.

“A vernal pool is a temporary body of water (wetland) that provides essential breeding habitat for certain amphibians – such as wood frogs, and spotted salamanders – and invertebrates – such as fairy shrimp. These unique wetlands typically cycle annually from flooded to dry. Vernal pools vary in size, shape, and location. Some are as small as several square feet in area; others extend to several acres during maximum flooding. The pools appear year after year in the same spots, except during exceptionally dry years. Pools occur in a variety of sites, including small depressions in the woods, kettle holes, and oxbows on river floodplains. Many occur in isolated depressions in areas far away from rivers and streams, lakes, and wetland areas. These differences are of little significance to the wildlife that depend on vernal pools for habitat; for them, the important considerations are water, food, cover (concealment) and lack of some predators.

Vernal pools are important as wildlife habitat because of the wide range of species that use them, including turtles, frogs, salamanders, fairy shrimp, clam shrimp, fingernail (or “pill” or “pea”) clams, caddis flies and other aquatic insects. Some of these species (certain invertebrates, salamanders and frogs) are rarely found outside of areas containing vernal pools. (Identifying and Documenting Vernal Pools in NH, 3rd edition, NH Fish and Game Dept., 2016)

Currently, Holderness has not specifically mapped any local vernal pools, but a bio-inventory study performed by the Squam Lakes Association in 2001 and 2002 found abundant and significant vernal pools in the watershed. Other studies have been done by students at Plymouth State University. The majority of vernal pools are located on private property in Holderness.

#### *Groundwater and Aquifers*

Stratified drift aquifers are made up of bedrock as the base and layers of porous materials such as sand or gravel. Ground water seeps through the layers of soil, sand, and gravel, which filter impurities out of the water, until it reaches the impermeable bedrock foundation. The layer of water which flows above the bedrock but within the porous layer is the aquifer.

Holderness has two main areas which overlay a stratified drift aquifer: one area is in the northwest section of town, east of the Pemigewasset River, and the other area which surrounds the joining of Carr and Owl Brooks. There is also a small section of drift aquifer north of East Holderness Road and south of White Oak Pond.

### **3. Cover Types**

#### *Forests*

Almost three quarters of the total area of Holderness (73%) is covered by forest. Excluding the 18% open water, forests cover about 90% of all the land in town. Most are second growth forests that were once cut over or burned at the time of settlement from 1770 to 1840. Over the course of that time, the initial primeval forests of hemlock, spruce, oak, pine, and chestnut were converted to farm fields, pastures, and fuelwood lots. Miles of stonewalls attest the fact that one time, most of Holderness was cleared. Many of the islands in Squam Lake, extensive marshlands, and steep slopes were the only places where trees remained. As a result, only a small fraction of the original forests can

be witnessed today. An old growth patch of hemlocks and ancient tupelo trees can be seen at Five Finger Point. Beech and oak are the most common trees, with white pine and maple found throughout the Town.

### *Agriculture*

Agricultural lands are important for communities because they provide local healthy food, sustain rural character, create a diverse economic base, provide potential habitat lands for birds of prey, and serve as corridor lands for species migration. Holderness has several parcels of agricultural lands, totaling approximately 700 acres being actively farmed. The agricultural lands are clustered near the Pemigewasset River and along the north side of Squam Lake. Due to the challenging topography, agricultural practices which require flat land for planting and harvesting can make certain types of farming in Holderness difficult.

### *Unfragmented Land*

Unfragmented land parcels of over 100 acres provide protected habitat for a wide variety of species and allows for feeding, breeding, and nesting to occur in areas far removed from development. A little over two-thirds of the land in Holderness (67.1%) qualifies as unfragmented. This land classification includes agricultural lands, woodlands, wetlands, water bodies, and rivers or streams less than ¼ mile wide. Land within 300 feet of a roadside is not considered to be part of an unfragmented parcel nor are rivers greater than ¼ mile wide and lakes with developed shorelines. Holderness has several significant tracts of un-fragmented land; the largest one being 4,387 acres on the Squam Range, and the second largest 3,410 acres on Mt. Prospect.

### *Conservation and Public Lands*

Conserved land helps preserve wildlife habitat, protect drinking water, and contribute to maintaining the character of the Holderness community. Agricultural, public, and un-fragmented lands also contribute to the wildlife and human communities but are not necessarily under permanent protection and have the potential to be developed.

In 2018, the 5,100 acres of permanently conserved land in Holderness represented 26% of all the land in town. The majority of these conserved lands are located on the Squam Range, with Burleigh Land Limited Partnership being the largest (2519 acres in Holderness) and Webster Ridge (Webster Land Corporation-483 acres). NH Fish & Game owns the 514-acre Owl Brook Hunter Education Center located off Perch Pond Road and is managed under the department's Hunter Education Program. Other significant conserved tracts included the Beij Preserve (359 acres), Armstrong Natural Area (138 acres) and Five Finger Point (77 acres). The Town of Holderness owns a few parcels held for conservation purposes, the largest being the Pilote Forest (105 acres). To access many of these conserved lands, there are about 20 miles of trails, the majority of them maintained by the Squam Lakes Association.

## **4. Wildlife**

The diversity of forested habitats, wetlands, shorefront, mountainous terrain, and river bottomlands in Holderness create habitat supporting a wide range of mammals, birds, reptiles, amphibians, insects, and plants. This is reflected by the N.H. Fish and Game

Department's mapping of high-quality habitat within the State (Referenced maps will be available at the Town Hall and on the town's website)

Perhaps the most significant ecological aspect of Holderness and biodiversity is its position at the meeting point of all three eco-regions of New Hampshire, namely, the White Mountain Ecoregion in the northern part of the state, the Vermont-New Hampshire Uplands Ecoregion in the western part of the state, and the Coastal Hills and Plain Ecoregion in the eastern part of the state. As a consequence, the area contains a mix of species that represent a broad range of climate tolerances and habitat types. Species that live in the warmer, south-facing slopes of the Rattlesnakes, for example, are typically found much farther south. Those species that live in the colder, spruce-fir forests of the ridge top are typically found much farther north. Mid-slope species on both sides of the Squam Range are most common to regions in the western part of the state as well as the surrounding Lakes Region.

In a two-year bio-inventory completed for the Squam Lakes Association in 2001-2002, over 550 species of vascular plants were recorded, or roughly 25% more than comparable bio-inventories completed in other regions of New Hampshire. The list also recorded 23 species of amphibians and reptiles, 27 species of freshwater fish, 191 species of birds, 43 species of mammals, and 683 species of fungi, all of which exceeded the 60<sup>th</sup> percentile of total possible species statewide. Within these assemblages, roughly 5% of the species are rare in the state, many of which, such as the American marten and the rock sandwort, are at their southernmost limits, while others, such as the bridge shiner and the purple clematis, are at their northernmost limits.

These rare species are typically observed in isolated areas away from development and roadways. The un-fragmented land areas described in the Forest Resources section define those areas where terrestrial wildlife populations can be expected to be the highest. The aquatic habitats are less subject to disturbance and typically retain wildlife species indicative of good quality habitat.

Since surface water is such a prominent feature within the town of Holderness, aquatic species also play a role in the natural resources and character of the town. On Squam and Little Squam Lakes, the common loon is a notable presence. Loon populations in Squam have rebounded after historic lows, but a decline in recent years is cause for concern. The combined legacy effect of contaminants found in stream and lake sediments may contribute to the decline, but partnered research and monitoring is ongoing to further understand this decline.

The Squam Lakes, White Oak Pond and small streams also support healthy fisheries. The Squam Lakes are home to native Atlantic Salmon and Rainbow Smelt as well as introduced Rainbow Trout, all of which require cold, oxygen rich waters during the summer months. Wild Brook Trout are also present in many local streams, evidence of cool clean water. Largemouth and Smallmouth Bass are also important species found in the Squam Lakes that are targeted by anglers. Holderness is home to two White Sucker runs; Mill Brook and Smith Brook. Other fish species commonly found in Holderness include White Perch, Yellow Perch, Chain Pickerel and Horn Pout (Brown Bullhead).

Landlocked Salmon and many Trout species are seasonally stocked by the NH Fish and Game Department.

## **Potential Threats**

### **1. Human Impact**

Holderness offers a unique range of lake views, mountain views and rural landscapes that are appreciated by both residents and visitors. Concern for protecting the rural character and scenic beauty of the area is evidenced in the increasing amount of land being put into conservation as well as local opposition to projects such as Northern Pass. The aesthetics of our local landscape is an important asset to both the tourist industry and local property values as well as to an outdoor focused lifestyle.

Significant areas of high-quality habitat in Holderness are due to the varying topography, the presence of Squam Lake and the Pemigewasset River, and large areas of unfragmented blocks of land. The combination of these qualities, along with conservation land, allows for plant and animal species to co-exist within an ecosystem which may be vital to the existence of neighboring natural communities. Identifying these habitats and species is necessary to understand the diversity of the area and should be considered when determining where to plan development and focus conservation efforts.

Potential threats to significant habitat areas and to significant species are often related to human disturbance. Development of undisturbed land will not only disrupt the immediate habitat but can also affect the surrounding natural communities by the creation of noise, change in sunlight exposure, increased erosion, habitat fragmentation, alteration of migration paths, and proximity to food and shelter for animal species. New roads and developments fragment land, which may be essential to a species' habitat requirements as well as introducing contaminants from automobile travel and road maintenance.

New Hampshire's, and in particular Holderness and surrounding communities, economic well-being is heavily dependent on tourism businesses related to summer and winter outdoor recreation. People come from far and near to experience the natural beauty of our mountains, lakes, and rivers. These natural resources also attract and retain a skilled workforce. Economic vitality and environmental protection are inextricably linked, and so are sustainable development and conservation.

However, there is a threat of overuse because many people choose to spend their recreational time here. Recreation in Holderness has a significant impact on the natural resources. Some trails, such as West Rattlesnake, have such a high level of foot traffic that it is contributing to trail degeneration and erosion, as well as a significant amount of canine and human waste along and at the top of the trail. Parking for the trails is being better managed, but often vehicles are parked poorly and impact drainage and planned water runoff channels. The Recreation Path that runs along Route 3 from the Post Office to the Town Hall was designed for high levels of foot traffic and is being used for such with limited impact on the areas adjacent to it.

Motorboat traffic on Big and Little Squam Lakes also has serious repercussions. This includes the impact on the shoreline by wake boats or high-speed boats, as well as the pollution caused by the gasoline and oil that end up in the water. Boating also plays a significant role in the spread of milfoil in and around the lakes. Fishing is another activity with serious impact because the fishing boats often have large motors that significantly disturb the lakes' surface. White Oak Pond is impacted much less than the Squam Lakes due to the motor restrictions, but still sees a number of motorboats.

Some threats to the local environment are beyond local control, such as climate change. The greenhouse gas emissions that result from the generation of energy are producing warmer winters, reduced snowfall and snow-on-ground days, earlier spring runoff, increased total rainfall, and more severe weather events that result in increased risk of flooding. The number of extremely windy days seem to have increased over the past twenty years. These changes have the potential to significantly change our economy and way of life.

## **2. Contamination of Natural Resources**

*Surface Water:* In general, water quality in the Squam Lakes is excellent, though monitoring data suggest there are trends toward poorer water quality in sites around both lakes. The Squam Lakes Association has tracked water quality in the Squam Lakes since 1979, and houses data and analysis from these years of study. The White Oak Pond Watershed Association has tracked the health of White Oak Pond since 1980, which is also a healthy water body. Surface water contamination can occur from several sources. Recent evidence suggests there is an increasing impact from road salt application. In 2017, evidence of PCBs, DDT and other legacy contaminants were found in Squam Lake. Further study is necessary to determine the scope and scale of contamination, the long-range impacts on the lake ecosystems, and the potential, if any, for remediation. (See Squam Lakes Watershed Management Plan, Squam Lakes Association, Feb. 2020)

All the waterways in New Hampshire suffer from mercury contamination due to air pollution entering the waterways by affixing to rain. Thus, all waterways in New Hampshire are classified as "Impaired" by NH DES. While Squam Lake has no restrictions on primary or secondary contact with the water, there may be the potential for bacterial contamination in Little Squam Lake. These issues affecting the surface water are part of a regional problem, and the effects on the local waterways are being monitored by local organizations.

*Aquifers:* Although the aquifers within Holderness do not currently supply the town with municipal drinking water, it would be beneficial to protect them for future use. One area of concern is in the northwest section of town where Plymouth's well-head protection area extends into Holderness. The northwest Pemigewasset aquifer is used as a water supply source for the town of Plymouth and there is a small section of west Holderness that is fed from this supply.

Contamination of a stratified drift aquifer supply can be difficult to remedy due to the multiple layers of soils and rock. The layers have varying levels of density and porosity and can trap contaminants, making extraction either technically or economically

unfeasible. The aquifer is not stagnant, which also contributes to the difficulty in cleaning up a contaminant. Newly contaminated water continues to flow with the clean water, thereby further spreading the contamination. Non-point pollution, such as run-off from nearby roads, is a significant source of contamination and is difficult to remedy not only due to the movement of the aquifer but to the widespread pollution source.

*Soils:* There are several sites within Holderness which may be of concern in the future as potential contamination sites. Uncovered salt piles and the use of road salt during the winter are of concern as the ice melts and carries the salt into the water system. Gas stations, old town dumps, industrial lands, junkyards, and mechanic garages are all examples of potential contamination sites for both soil and ground water contamination. While a site may not currently be of concern, identifying the potential of a site can be helpful for any unexpected future occurrences. For example, an existing gas station may not have any current leaks but may be the subject of prior or future leaks.

The potential use of lead shells and shot may contaminate water supplies on two abutting shooting ranges, one owned by the Pemigewasset Valley Fish and Game Club and the other, Owl Brook Hunter Education Center, owned by NH Fish & Game. Regular water quality monitoring is important in catching any contamination early on and communication between the shooting ranges and the town is essential. Both ranges have monitoring wells which have tested negative for lead contamination.

*Arsenic:* Recently some of the deep wells in and around Holderness have tested positively for significant levels of arsenic. Private well owners are exposed to arsenic when underground water flowing over arsenic-rich rock may become contaminated with a toxic form of arsenic, which can make its way into private wells. Approximately 40 percent of the residents of New Hampshire use water from a private well, and approximately one-fifth of those wells contain water with arsenic levels above 10 parts per billion, the EPA standard for public water supplies. Most Holderness residents have private wells. Recent studies indicate that even at lower doses long term exposure to arsenic poses a risk to human health. Since many contaminants like arsenic have no taste, odor or color, laboratory testing is recommended.

*Non-native Invasive Species:* Non-native invasive species are plants, animals, or other organisms that are introduced to a given area outside their original range and cause harm in their new home. They usually spread rampantly, have no natural enemies to limit their reproduction, and have typically developed unique abilities to out-compete (grow faster than) native species. Non-native invasive species are recognized as one of the leading threats to biodiversity and impose enormous costs to agriculture, forestry and fisheries. Non-native invasive plant species in Holderness include Oriental bittersweet, garlic mustard, honeysuckle, Japanese knotweed, burning bush, barberry, and purple loosestrife.

Variable milfoil is an aggressive aquatic plant that forms dense mats that crowd out native vegetation, deplete oxygen, challenge recreation, and breed mosquitoes. Both Squam and Little Squam Lake were once considered impaired for the presence of variable milfoil. These issues affecting the surface water are part of a regional problem, and the effects on the local waterways are being monitored by local organizations.

Insects such as the emerald ash borer, Asian longhorn beetle, and the hemlock woolly adelgid have impacted our native trees. Spotted wing drosophila and the brown marmorated stinkbug continue to multiply and impact local crops and gardens.

### **Recommendations**

- Continue to work with surrounding communities and citizen organizations to address common natural resource preservation, conservation and low impact recreation goals.
- Increase awareness and enforcement of current ordinance provisions, particularly as they apply to the natural resources.
- Enhance public education on Best Management Practices for natural resource protection.
- Continue to protect the viewsapes as much as practicable. Continue to maintain an inventory of viewsapes to be preserved as a natural resource. Post the inventory on the town website.
- Put the town conservation and recreation properties into conservation easements.
- Support land and aquatic invasive species management.
- Continue to protect our shorelines, wetlands and vernal pools through education and compliance with our ordinance.
- Continue to support “Dark Skies” initiatives.
- Identify those septic systems that do not meet the current standards or are failing and upgrade those systems where necessary.
- Update town Best Management Practices for road installation and maintenance to better control erosion and runoff.
- Support efforts to define soil, subsurface and surface water contaminants other than nutrients (e.g. PCBs, Pesticides, etc.).
- Encourage homeowners to regularly test their private wells for arsenic and other natural pollutants by providing State of NH test kits at Holderness Town Hall.
- Encourage homeowners to have their homes tested for natural radon.

### **Appendix – Town of Holderness Master Plan Maps**

Courtesy of the Squam Lakes Conservation Society and Zak Brohinsky

- Land Cover
- Wildlife Action Plan
- Wildlife Action Plan & Conserved Land
- Conserved Land
- Streams & Wetlands
- Unfragmented Blocks
- Slope